No. 5 Original

In the Supreme Court of the United States

OCTOBER TERM, 1942

THE STATE OF COLORADO, *Complainant*,

vs.

THE STATE OF KANSAS and THE FINNEY COUNTY WATER USERS' ASSOCIATION, a corporation, *Defendants*.

PETITION FOR REHEARING

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20-2103

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PETITION FOR REHEARING

The defendants herein respectfully petition this Honorable Court for a rehearing of this case for the following reasons:

1. The Court erred in its analysis of the evidence respecting depletion of the water supply by Colorado.

2. The Court erred with respect to Colorado ditch diversions.

3. The Court erred with respect to divertible water prior to 1907.

4. The Court erred in failing to properly consider or analyze Kansas and Colorado irrigated acreage.

5. The Court erred in failing to consider acreage in Colorado as a measure of permanent depletion of water supply.

6. The Court erred with respect to the damage of the substantial interests of Kansas.

7. The Court erred in assuming sites for feasible reservoir development in Western Kansas.

8. The Court erred in assuming that there is a question of the right of non-riparian irrigators in Western Kansas to divert water from the Arkansas River for irrigation.

While the foregoing represents some of the more obvious reasons reflected by the opinion of the Court for granting further opportunity for a more thorough examination of the facts as disclosed by a complete record, we further respectfully suggest that this Court by its decision has repudiated its previously announced doctrine of equitable apportionment of the waters of an interstate stream by permitting the unrestrained and unrestricted diversion by Colorado of all of the water physically divertible by it from the Arkansas River, and by refusing to grant the State of Kansas either relief from such diversions or a definition of the extent of that equitable share upon which in the future some reliance can be placed.

This Court, in submitting this matter to Judge Cav-

anah, selected as its Special Master a federal judge familiar through long years of experience, and through adjudication of rights with the principles and practices of irrigation. The Special Master of this Court placed before it a report in which all basic findings were resolved in favor of the contentions of the State of Kansas. Apparently the Court felt that there should have been included therein those specific portions of the record, and recitations of evidence upon which the Master relied, as additional findings of fact to support his basic conclusions.

It will be recalled that the Special Master herein was the Court's appointee. If, after more than a year's study of a most voluminous record and complicated exhibits, and the hearing of much testimony, a report was submitted to this Court which was not sufficiently detailed in the presentation of specific facts upon which he relied, it seems to defendants unfair that they should be penalized by such failure and by not having the matter re-referred to such Special Master, for further amplification in order that the Court might have the benefit of his exhaustive study and irrigation experience.

Instead of following such procedure, to which the defendants would not have objected, the Court repudiated entirely all of his basic findings of fact by attempting in a

period of less than 60 days to examine and understand a record of 39 volumes and some 368 complicated exhibits. Defendants respectfully submit that an understanding of this evidence was a physical impossibility in the time during which the Court had this matter under consideration. The result was that many undisputed and pertinent portions of the record, which defendants believe were controlling in the determination of this case, were overlooked by the Court.

Defendants urge that such procedure in dealing with the rights of a sovereign state does in all fairness call for a rehearing and a more extended examination of the record, either by the Court itself or by a re-reference to the same or another Special Master. In support of this application defendants here submit more specific detail respecting the errors of the Court reflected in its opinion.

The Court Erred in its Analysis of the Evidence Respecting Depletion of the Water Supply by Colorado.

The Court states at page 9 of its opinion:

> "The Master concludes that there has been a material increase in the depletion by Colorado, a consequent diminution of the flow across the state line, and injury to the substantial interests of Kansas. His report does not state what he considers material, or the extent of the diminution of flow . . ."

Rather than re-refer this to the Master, whose familiarity with the evidence was the result of months of close application and study of the entire record, the Court states, "We must therefore turn to the evidence to resolve the issues." In the Court's consideration of the evidence respecting depletion by Colorado, it fails to properly analyze the Kansas evidence, that since 1905 Colorado's use of water had increased by 300,000 acre-feet. The Court rejects this testimony as being incorrect, making the categorical statement respecting Witness Meeker, "On his own estimates the claimed average annual depletion of 300,000 acre-feet could not have taken place." The statement of the Court shows clearly that it has not followed sound principles, and that the conclusion is erroneous.

In any problem, regardless of its nature, involving use, consumption or depletion the following principles are axiomatic:

1. What is consumed or used is the difference between the original quantity and that which remains after the use is subtracted.
2. That determination of the amount of a progressive use or consumption over a period of time is the difference in the use at the beginning of the period and the use at the end of such period.

Defendants respectfully state that the Court has failed to recognize or follow either of these plain principles in

its analysis of undisputed evidence of river depletion between 1905, the close of evidence in the Kansas-Colorado case, and 1930.

As a basis for what follows we suggest the following simple problem as an example: Last week one has seven apples and eats five, having two left. This week one has 10 apples and eats eight, having two left. How many more apples were consumed this week than last week? The obvious answer is that, comparing last week with this week, there were three more apples eaten this week than last although the quantity remaining in each period was the same. Would this Court in dealing with this simple problem say that such answer was incorrect, and that if, as claimed, in order for three more apples to have been consumed this week than last, there would have to be not two apples left last week, but five? Certainly not. Yet this is exactly the reasoning of the Court set out in its opinion in rejecting the testimony of depletion of 300,000 acre-feet in the water supply by Colorado.

At page 9 of its opinion, after stating that the annual average state line flow during the period 1908 to 1930 was 260,700 acre-feet (a period, incidentally, that includes many of the years when progressive depletion was taking place), the Court then proceeds to make this statement:

> "If, as claimed, this flow remained after an additional annual depletion of 300,000 acre-feet by Colorado, the average annual flow in the earlier period (presumably state line flow) 1895 to 1908 would necessarily have been greater by 300,000 acre-feet, or would have averaged 560,700 acre-feet."

This statement could be correct only upon the erroneous assumption, unsupported by the evidence, that the basin water supply in that earlier period amounted to 1,240,000 acre-feet. Such assumption is not correct, and shows either a misunderstanding or a complete disregard of the evidence.

Although the evidence shows that a study of state line outflow, without reference to the total water supply, is of no value as a basis for determination of river depletion at the state line (R. 1579), and that a comparison of state line outflow with water supply by years is essential in determining water depletion (R. 1578-9), this Court has disregarded the existing water supply completely in arriving at its conclusions. If we take the periods selected by the Court and compare them properly the facts disclose:

Period	1895-1908		1908-1930	
Av. Water Supply	1,106,000 A. F.	(Kan.	1,350,000 A. F.	(Kan.
Av. State Line Outflow	408,000 A. F.	Exh. 70)	260,700 A. F.	Exh. 70)
Depletion in Average Supply by Consumption	698,000 A. F.		1,089,300 A. F.	

What then is the increase in consumption between the two periods:

Consumption	1908-1930	1,089,300 A. F.
Consumption	1895-1908	698,000 A. F.
Increase in Depletion		391,300 A. F.

Whether in comparing consumption in two selected periods the factor is water or apples, the principle is the same, and yet for the periods which the Court selected in its analysis of the evidence we find that the water supply was depleted in the latter period 1908 to 1930 to an average extent of 391,000 acre-feet, 91,000 acre feet more than the 300,000 acre-feet which Mr. Meeker testified was the extent of depletion since 1905. This amounts to a depletion by Colorado of 31 percent of the average annual water supply of 1,240,000 acre-feet, or 35 percent of the dependable water supply of 1,110,000 acre-feet. This decrease of approximately one-third of the water supply of a stream certainly is indicative of substantial damage to Kansas' interests.

The period selected by the Court for its comparison included in the earlier period three years following the conclusion of evidence in the Kansas-Colorado case, and eliminated them from consideration in the latter period.

If we use the period, 1895 to 1905, and compare it with

the period, 1906 to 1930, we have the following depletion indicated:

Period	1895-1905		(Kan.	1906-1930		(Kan.
Av. Water Supply	1,114,000	A. F.	Exh.	1,313,200	A. F.	Exh.
Av. State Line Outflow	439,000	A. F.	70)	297,100	A. F.	70)
Depletion in Average Supply by Consumption	675,000	A. F.		1,016,100	A. F.	
Depletion 1906-1930	1,016,100	A. F.				
Depletion 1895-1905	675,000	A. F.				
Increase in depletion	341,100	A. F.				

The selection and comparison of these two extended periods, the earlier with the later, is however, not a correct method of ascertaining the extent of depletion since the close of evidence in the old Kansas-Colorado case. Depletion is progressive.

The question concerning which Mr. Meeker, the Kansas witness, was testifying was the increase in depletion since the close of evidence in the Kansas-Colorado case in 1905, and this necessitated a determination of depletion as of that time, and the extent to which the water supply was depleted at the time of his testimony, or at the end of the period in 1930. This point was never considered or referred to by the Court in analyzing the testimony, that depletion had increased by 300,000 acre-feet since 1905.

Again, what are the facts? If we compare the period 1903-1907, the five years immediately preceding the decision in *Kansas v. Colorado*, with the five-year period,

1926 to 1930, the last period during which water supply figures were available, we find the following:

Period	1903-1907	1926-1930
Av. Water Supply	1,234,000 A. F.	1,312,000 A. F.
Av. State Line Outflow	472,000 A. F.	264,000 A. F.
Depletion in Average Supply by Consumption	762,000 A. F.	1,048,000 A. F.
Depletion 1926-1930	1,048,000 A. F.	
Depletion 1903-1907	762,000 A. F.	
Increase in depletion	286,000 A. F.	

Or, if we take the period from the commencement of the litigation to the close of testimony, namely 1901 to 1905, and compare it with the last five years with respect to which we have an analysis of the total water supply, we find the following:

Period	1901-1905	1926-1930
Av. Water Supply	1,118,000 A. F.	1,312,000 A. F.
Av. State Line Outflow	464,000 A. F.	264,000 A. F.
Depletion in Average Supply by Consumption	654,000 A. F.	1,048,000 A. F.
Depletion 1926-1930	1,048,000 A. F.	
Depletion 1901-1905	654,000 A. F.	
Increase in depletion	394,000 A. F.	

It is obvious that with an available water supply from year to year, some years plentiful and some years scarce, that a still further test of the extent of depletion is a comparison of years of similar water supply in the earlier period with those in the latter, such a comparison appearing at pages 94 to 99 of defendants' original brief, and being available to the Court will not be repeated here; but in

connection with this motion we respectfully ask that it be re-examined.

Defendants, however, make one comparison, which seems pertinent, between the years 1903 and 1905, where state line outflow was not estimated but measured by the U. S. G. S. This outflow can be compared with that of the later period of years, 1928 to 1930. In the years 1903 and 1905 the state line outflow averaged 674,300 acre-feet. In the last period of years, 1928 to 1930, the outflow was 264,000 acre-feet. This shows a diminution in state line outflow of 410,300 acre-feet between 1905 and the last five-year period. We admit that this is not an accurate basis of comparison, since there is no reference to the water supply, and a comparison only is made of state line flow, but it is the method used by the Court and set out in its opinion.

However, to use the proper method, reference must be made to the water supply available for consumption. If we do this, the facts are as follows:

Period	1903 & 1905	1926-1930
Av. Water Supply	1,410,000 A. F.	1,312,000 A. F.
Av. State Line Outflow	674,300 A. F.	264,000 A. F.
Depletion in Average Supply by Consumption	735,700 A. F.	1,048,800 A. F.
Depletion 1926-1930	1,048,000 A. F.	
	735,700 A. F.	
Increase in Depletion	312,300 A. F.	

This again substantiates Kansas' testimony of an increased consumption since 1905 of approximately 300,000 acre-feet.

If state line outflow for the years 1903 and 1905 is compared with the period 1931 to 1938, with respect to which latter period Colorado introduced evidence after the case was originally closed, we find that the outflow 1903 to 1905 amounted to 674,300 acre-feet. During the period 1931 to 1938 the outflow amounted to only 158,000 acre-feet. This shows that the state line outflow was less by 525,300 acre-feet in the latter period than it was at the time of testimony in the old Kansas-Colorado case. This again we respectfully point out was the identical method pursued by the Court in using state line outflow, without any reference to the water supply available for consumption.

Unfortunately, in the time allowed by the Master when the case was reopened it was impossible for engineers to produce a water supply study, which requires many months of work, for these later years.

Witness Meeker's testimony (R. 1564-1587) analyzed the facts respecting depletion. At R. 1565 he shows a Colorado consumption had reached 760,000 acre-feet by 1907, but had increased to 1,060,000 acre-feet by 1930, a difference of 300,000 acre-feet.

To the same effect is R. 1587. Further, at R. 1742 occurs the statement that since the close of testimony in the *Kansas v. Colorado* case consumption of water in Colorado has increased to the extent of 300,000 acre-feet of the average dependable supply. This is reflected by Kansas Exhibit 68, showing that in the five year period ending 1967 consumption was 68 percent of the average dependable supply, and in the five year period ending 1930 the consumption was 96 percent of the dependable supply, or an increase of 28 percent. 28 percent of 1,110,000, the amount found by the Special Master to be the dependable supply, and which was not disputed in the evidence, amounts to 310,800 acre-feet.

We submit that in the face of the foregoing facts, approached from almost any angle, in comparing periods at the close of the Kansas-Colorado case and the latter periods, the statement of the Court referring to Mr. Meeker's testimony, "On his own estimates the claimed average annual depletion could not have taken place," is erroneous, is contrary to the evidence, and is based upon an improper assumption that depletion can be determined by any other formula than the basic principle that use is measured by the difference between the water supply available for use and the residue remaining and passing across the state line after use has taken place.

Further, to say as the Court has, that the force of this evidence is weakened by Kansas' allegation in *Kansas v. Colorado*, Supra, to the effect that "In her bill in that case she alleged Colorado had totally destroyed the normal flow of the River, exclusive of floods, whereas she now asserts that the flow at the time of the earlier suit was such that Colorado has been able to deplete it on an annual average of 300,000 acre-feet," suggests a failure to distinguish between the issues in the two respective cases.

As pointed out at page 184 of Kansas' brief, in the old case Kansas sought an injunction to enjoin Colorado from diverting or using any of the water of the Arkansas River, and claimed the right to have the waters of that stream flow into Kansas undiminished. Normal flow and natural flow are synonymous. It is the flow of the river undiminished by irrigation uses. The facts in that case disclose that such original normal or natural flow had been destroyed by 1901. The record shows that the Canon City flows representing run-off from melting snows over the long-time average approximated only 45 percent of the total water supply. Assuming that this normal and expected run-off was completely consumed by the period of the old Kansas-Colorado case, there would still remain an average supply of 620,000 acre-feet remaining, which,

although consisting to some extent of flash run-off, was usable for irrigation purposes in both Kansas and Colorado, for as stated by Witness Patterson for Colorado, water is usable insofar as the diversion capacity can take it. Therefore, no one understanding the River and its characteristics would say that a destruction of the *normal* flow of the stream by the year 1901 would prevent further depletion of the water supply to an extent of 300,000 acre-feet of the average annual dependable supply.

The Court Erred With Respect to Colorado Ditch Diversions

The Court makes the following statement:

> "The records of Colorado's consumption and ditch diversions, and the Colorado and Kansas exhibits showing the divertible and usable state line flow, rebut such an increase as Kansas asserts." (an increase in consumption by Colorado to the extent of 300,000 acre-feet) Page 10 of opinion.

This again indicates a failure to relate basin water supply to the question of supply available for irrigation use.

Colorado's testimony and exhibits with respect to ditch diversions related only to that section of the River from Pueblo to the state line. Colorado Exhibit 118 (R. 3210) shows that in 1912 in that segment of the basin which

they selected as the basis for their testimony there were only 305,000 acres of land under irrigation as against 483,000 acres in the basin, or only 63 percent of the total irrigated acreage in that year.

It is true that Kansas Exhibit 96 (R. 1744) shows no substantial increase in the yearly ditch and canal diversions in Colorado from the period around 1912 to the period around 1930 between Canon City and the state line, but this again was a limited river section only, and was not intended to be taken as representing the water diverted for use in the entire basin. However, even in this limited section the record clearly shows, facts which the Court has overlooked (R. 5150 and following), that even in this section, where the acreage increase between 1912 and 1930 was only 37,000 acres (Kansas Exh. 56, R. 1513), the recorded diversions failed to include large quantities of water intercepted and used for irrigation purposes, which were never recorded. Certainly when the Court focuses its attention and arrives at its conclusion on the basis of a limited river section, rather than the entire basin, it calls for a re-examination of the facts respecting the entire area.

If the Court had taken occasion to examine the record respecting diversions for the entire basin, we respectfully

suggest that it could hardly have made the statement herein referred to, which defendants suggest was erroneous. Kansas Exhibit 133 (R. 7000) gives the Colorado State Engineer's records, taken from his bi-annual reports, showing the amount of water diverted in the Arkansas River basin as a whole. The facts set out in this exhibit were unchallenged by Colorado, and are undisputed on the record. This exhibit shows that the average of the basin diversions for the years 1908, 1910, 1911, 1912 and 1913, for which records were reflected by the Colorado reports, was 997,105 acre-feet. Comparing these with the last five years, 1932, 1933, 1935, 1936 and 1938 (omitting 1934 and 1937 because of obvious inaccuracies), the average annual diversions amounted to 1,391,732 acre-feet, or an increase of 394,637 acre-feet between the periods.

Colorado throughout the record attempted to focus testimony upon a limited river section between Pueblo and the state line, and the Court apparently confined its consideration to this limited and misleading picture, and failed to consider or even examine the records with respect to the basin in its entirety.

The Court further makes the statement respecting the variability of stream flow that "The main river below Canon City may be almost without water one day, run a

flood the next day, and on the following day be in practically its original condition." In making this statement the Court obviously cannot have carefully considered the undisputed testimony reflecting the flow of the stream below Canon City during the critical period of the growing season when the requirements of water for irrigation purposes is important.

An examination of that testimony, as reflected by the tables shown at pages 96 to 100 of Kansas' original brief, show that during the entire critical period of the growing season, May, June, July and August, for the entire period of 1912 to 1931, a total of 2,460 days, that in only 65 days of this entire period did the diversions by Colorado ditches go as low as the bracket indicating 1,000 to 750 second-feet. In 1,414 days of this same period ditch diversions were in excess of 2,000 second-feet, while in 624 days the diversions exceeded 3,000 second-feet.

Such undisputed facts as these hardly substantiate the Court's conception of a river almost without water below Canon City during a critical period of irrigation needs. We will agree that the quoted statement reveals an extremely accurate picture of the usual condition of the River at the state line after the flow has been rendered almost useless to meet irrigation needs by reason of Colo-

rado's depletion, for these same charts show that in this same period of 2,460 days, 1,637 indicated a flow of less than 200 second-feet passing the state line, while of these 1,637 days, 1,072 showed a flow of less than 50 second-feet, or substantially for irrigation purposes a dry stream.

The Court Erred With Respect to Divertible Water Prior to 1907

The Court, at page 12 of its opinion, makes the following statement:

> "It appears nevertheless that since 1904 an increased quantity of usable water has passed the state line, *for it is testified by Kansas' expert witness that between 1895 and 1902 no divertible water passed the line, and none betweer 1903 and 1907, except in 1903 and 1905.*"

Respectfully, we call the Court's attention to the fact that no such testimony appears in the record at any point. It clearly appears that the Court did not give sufficient attention to the record to ascertain what the undisputed facts were. It would seem that when the undisputed facts are that the average state line flow for the years 1903 and 1905 amounted to 674,300 acre feet, the Court should have realized it to be a rather violent assumption that no divertible water passed across the state line in the years from 1895 to 1908, with the exception of 1903 and 1905.

We quote the record on this point, referring to a discussion of Exhibit 70 appearing in Kansas' brief, page 76. At R. 1573 is the following:

> "*Question:* I note, Mr. Meeker, that certain of these columns have no black area (water divertible by Kansas canals April to October). I think they are all the years up to 1908, with the exception of the years 1903 and 1905, as I see it here. If I am correct, why are there no black areas on these other earlier years?
>
> "*Answer:* No records of daily flow were available for sufficiently long periods to prepare the quantity of divertible water by the Kansas canals.
>
> "*Question:* So these black portions had to be computed from actual daily flow?
>
> "*Answer:* That is true."

Again, at R. 1575 Mr. Meeker states:

> "These bars which do not bear the black portion at the base represent those years prior to the establishment of any records of daily flow from which computations could be made. Now there was no other basis for determining the black areas, and that was that all river flows of 25 second-feet, or under, were excluded for the reason of the evaporation losses in the river channel during the irrigation season."

When the record further shows that the average state line flow, 1895 to 1908, amounted to an average of 408,000 acre-feet annually (Kansas Exh. 70), as against an av-

erage state line flow, including the Holly drain, of 140,264 acre-feet from 1931 to 1940, inclusive (Colorado Exh. 193), such an erroneous statement as that here referred to on the part of the Court certainly calls for re-examination and re-appraisement.

The Court Erred in Failing to Properly Consider or Analyze Kansas and Colorado Irrigated Acreage

The acceptance by the Court of the United States census figure for 1939 of 469,535 acres under irrigation in the Arkansas River basin in Colorado as reflecting the true status of Colorado's irrigated acreage is to predicate its conclusions upon one year with a most abnormal condition of water shortage, and is to disregard completely both the normal conditions of stabilized use on the Arkansas River or the actual effect of the priority system in operation in Colorado.

The actual acreage in irrigation in the basin for each year are reflected in Kansas Exhibit 61 for the period 1895 to 1930, and by Colorado's Exhibit 196, page 1. These two exhibits taken together show that from 1915 until 1933, a period of nineteen years, the average irrigated acreage maintained in the Arkansas basin in Colorado amounted to an average of 521,000 acres. In only two years of this

entire period did the acreage fall below 500,000 acres. This occurred in the year 1922, when it dropped to 496,000 acres, and in 1933, when it likewise dropped to 496,000 acres.

If we accept this average as indicating a fairly stabilized condition, the increase in acreage from the time of the census in 1902 amounted to an increase of approximately 221,000 acres. What then is the significance of the acreage disclosed by the census of 1939 of only 469,535? Does this represent a condition or an isolated and misleading fact based upon abnormal conditions?

The record shows as an undisputed fact that in the operation of the priority system in Colorado ditches divert water from the stream to the extent of and in the order of their adjudicated priorities. Thus, in a period of water shortage late priorities are unable to divert, and if in any particular year of water shortage land is not served by water, it is, during that year eliminated from consideration in Colorado's computation of irrigated acreage, even though for the past ten years it has been irrigated, and with recurrence of normal water supply will again be irrigated in the future.

The methods used by the Water Commissioners in reporting irrigated acreage as only that acreage actually us-

ing water in a particular season is very clearly shown by the Record at pages 6826 to 6833. As stated by Colorado's Witness Patterson, at R. 6831, "I think the water supply, or as you call it 'the water opportunity' is one of the factors that tends to regulate or govern the variations in the amount of land irrigated." That the year 1939 was an exception and subnormal with respect to opportunity is clearly reflected by the record. For the year 1939 the Canon City flow measured only 381,160 acre-feet, or only 69 percent of the long-time average, only three years in the entire period from 1891 reflecting a lower mountain run-off. Likewise, during this same period the flow of the Purgatoire River, the main tributary of the Arkansas River, amounted to only 16,742 acre-feet (see Colorado Exhibit 193), and amounted to only 16 percent of the long-time average. The state line outflow into Kansas in 1939 amounted to only 51,989 acre-feet.

When the Court came to consider the extent of the acreage in Kansas being irrigated by diversion from the Arkansas River, many facts shown by the record were apparently overlooked. In the earlier period, in using United States Census data relating to such acreage, the Court apparently overlooked those portions of the record where gross errors in the census figures were pointed out

by Witness Knapp (R. 2356-57). The U. S. G. S. failed to include large quantities of irrigated acreage in Kansas.

The records of the Kansas State Board of Agriculture, which Colorado's Witness Patterson testified he had found unusually accurate, were completely disregarded. These records relating to Kansas' irrigated acreage are found in Kansas Exhibit 115, R. 2355, and show that in the year 1899 the total irrigated acreage in the three Western Kansas counties amounted to 42,513. At this particular time there was no pump irrigation in Western Kansas. In fact, there was no pump irrigation in this area until some time after the conclusion of evidence in the Kansas-Colorado case. So that the entire 42,513 acres were all irrigated by diversions from the River under the existing ditches in the western counties.

The situation in 1939 relative to irrigated acreage in Kansas is not disputed, and is clearly disclosed by the testimony of Colorado's Witness Patterson (R. 6837-39). He further testified (R. 6561) that the number of acres remaining under irrigation in the western counties in Kansas dependent upon the surface flow of the River amounted to 22,428. These figures correctly portray the true situation of the Kansas ditches with respect to their efforts to divert water from the Arkansas River for irri-

gation. In view of the fact that the Court in its consideration of irrigated acreages in both states based its conclusions concerning Colorado upon an isolated and abnormally low year, and relative to Kansas failed to consider the extent to which its acreage irrigated by diversion from the River had been reduced, it would seem that fairness would call for a re-examination of the evidence respecting these factors.

The Court Erred in Failing to Consider Acreage in Colorado as a Measure of Permanent Depletion of Water Supply.

The Court at page 11 of its opinion states:

> "Thus, a total of about 170,000 additional acres has been put under irrigation since 1902. On its face this record would seem to indicate a large increase of consumptive use by Colorado, but the acreage under irrigation does not afford a reliable measure of actual consumption."

In the first place, the Court in arriving at the figure of 170,000 additional acreage since 1902 utilized the acreage obtaining water in the extremely dry year of 1939, an isolated and exceptional year, rather than the average acreage maintained under irrigation. This would have been a fair and more comprehensive approach, since it would reflect the amount of acreage irrigated in the Arkansas

River basin under the usual and expected water supply conditions. Had the Court done this, and taken the average of acreage irrigated each year since 1915 (a date which fairly reflects the additions of new acreage to the irrigated area), there would have been disclosed an average irrigated acreage covering a period of twenty-five years of 509,000 acres, which would have indicated an increase in irrigated acreage since 1902 of 209,000 acres, and this 209,000 acres would represent the true factor of the additional burden imposed upon the water supply since the year 1902.

When the Court rejects the implications of the permanent burden placed upon such water supply of the basin by this additional acreage by stating that "Acreage under irrigation does not afford a reliable measure of actual consumption," it overlooks completely the real issue in this case, which is one of permanent depletion of water supply.

The Court in the case of *Kansas v. Colorado* advisedly used the language:

> "At the same time it was obvious that *if the depletion* of waters of the River by Colorado continues to increase, there will come a time when Kansas may justly say there is no longer an equitable division of the benefits,"

and further in the decree:

> "Whenever it shall appear that through a MATERIAL INCREASE IN THE DEPLETION of the waters of the Arkansas by Colorado . . ."

Since the term depletion connotes a permanent condition, we submit to the Court for re-examination the fact that acreage is the truest measure of the permanent burden which can be placed upon the water supply of any stream.

We submit to the Court that defendants did not at any point in their original brief indicate that acreage was a reliable measure of actual consumption. Defendants did state, and here again urge, that it is an accurate measure of the extent of permanent stabilized consumption, which represents the permanent burden for all time placed upon the River by irrigation uses. As the Court correctly pointed out:

> "When first turned in the water is rapidly absorbed by the subsoil, with consequent high consumption. By continued irrigation the subsoil becomes saturated, the water table rises, and water in increasing quantities flows back to the stream."

What the Court does overlook is that there is a point below which consumption can never fall, which is represented by the complete consumption of water in irrigation

uses through evaporation and consumption for plant growth. This is recognized by irrigation authorities as permanent stabilized consumption, and represents the permanent burden of water depletion which the irrigation of a given acre of land imposes upon the water supply of any stream.

As Colorado's testimony indicates (R. 4372), consumption under stabilized conditions in the Arkansas River basin would represent a factor of 1.9 acre-feet per acre. If we take the 209,000 acre increase, that increase in acreage, as long as the same is irrigated, is bound to impose a complete and permanent depletion of water supply to the extent of 209,000 times 1.9, or 397,000 acre-feet of totally consumed water, which, except for the imposition of such acreage upon stream flow, would otherwise be susceptible to use; or if the Court prefers to use the increase of 170,000 acres, this increase in acreage would represent a permanent depletion to the extent of 323,000 acre-feet of the water supply.

In the case of *Kansas v. Colorado*, Mr. Carpenter, one of Colorado's main witnesses, testified as to the manner through which the development of seepage and return flow, through instances on the Platte River, would develop a much more stabilized water supply for areas lower

down on the stream. This probably was persuasive upon the Court at that time that Colorado had not then so permanently depleted the water supply as to have invaded Kansas' right. Defendants here assert that had the acreage then indicated by the Court, namely 300,115 acres, been maintained as the permanent burden upon the water supply in Colorado, at the present Kansas would have an ample water supply from which, with the existing diversion capacity of her ditches, amounting to 2,000 acre-feet, she could be irrigating upwards of 150,000 acres of land, but when with each succeeding year all existing return flows were completely recaptured and utilized within the State of Colorado, and an additional burden to the extent of over 300,000 acre-feet of the water supply was imposed upon the stream, the water users in the State of Kansas were thereby deprived of what the Supreme Court in the old case referred to as their right to the like beneficial effects of a flowing stream.

We therefore re-assert, and ask for further consideration of these facts which the record shows conclusively represents one of the truest measures of permanent depletion of water supply, and which indicates the permanent depletion since the old case to be an amount in excess of 300,000 acre-feet.

It should be further interesting to the Court that a permanent depletion of the water supply of the basin, whether approached from the angle of a complete analysis of the water supply with relation to its outflow at the state line, or whether approached from the completely different position of the extent of the increase in irrigated acreage, is proved to be in excess of 300,000 acre-feet.

The Court Erred With Respect to the Damage of the Substantial Interests of Kansas

The Court in its opinion apparently rejects its previously announced doctrine that as between two states on an interstate stream there should be an equitable apportionment of the benefits thereof. The defendants had assumed that the invasion of such an equitable right, which this Court had previously said existed, constituted damage, and, that even though the extent of Kansas' share in the flow of the stream had not heretofore been defined, as a sovereign state she had a right to seek from the Supreme Court a definition of those rights and redress against an invasion thereof. The Court, however, apparently narrows the conception of damage to the sole fact that Kansas must show a reduction of her acreage irrigated from the waters of the River, or else be denied relief.

The Court states:

> "The acreage under irrigation in Western Kansas through existing ditches has steadily increased over the period 1895 to 1939 from approximately 15,000 acres to approximately 56,000 acres."

This is not a correct statement of the facts disclosed by the record. As heretofore pointed out in a previous section, the acreage irrigated in 1899, which was entirely and exclusively by diversions from the River, amounted to 42,513 acres (Kansas Exh. 115, R. 2355), and according to Colorado's own witness, Mr. Patterson, the amount which is now attempting to irrigate by diversions from the River has dropped to 22,428 acres. (R. 6561). These facts show that, even though ditches were in existence with a diversion capacity of 2,000 second-feet, there was a decrease of 47 percent in the acreage irrigating by ditches from the flow of the Arkansas River. During this same period the irrigated acreage in Colorado increased by 44 percent. We respectfully suggest that this fact alone constitutes substantial damage, where the question of irrigation by diversion from the waters of an interstate stream is involved, and more particularly since in the case of *Kansas v. Colorado* in defining the rights of the respective states to the use of waters of the Arkansas River for irrigation purposes used this language:

> "To secure as far as possible to Colorado the benefits of irrigation without depriving Kansas of the like beneficial effects of a flowing stream."

Again the Court states in its opinion:

> "Tables taken from the United States Census show that in 1899 the acreage irrigated in these counties (the three western Kansas counties) was 6 percent of that irrigated in the Colorado basin, in 1909 was 7 percent, in 1929, 9.7 percent, and in 1939, 10.7 percent. It seems that Colorado cannot have depleted the usable supply passing into Kansas if acreage under irrigation is any measure of depletion."

In arrinving at such percentages it is obvious that the Court resorted to Census data respecting the Kansas acreage, grossly in error, which errors were pointed out in the record, R. 2356-2357. Had the Court utilized the acreage under irrigation by the Kansas ditches from the flow of the Arkansas River, it would have reached an entirely different result. It would have been shown that in the year 1899 as against a total acreage in the Arkansas basin in Colorado of 325,000 there were 42,513 acres in Kansas diverting water by ditches from the Arkansas River, or 13 percent. It would further have been disclosed that in 1939 the acreage remaining in Kansas diverting solely from the Arkansas River had decreased to 22,428 (R. 6561), and that this amounted to only 4.7 percent of

the Colorado acreage irrigated in that year, and only 4.3 percent of the average irrigated acreage maintained continuously under irrigation in Colorado during the period 1915 to 1932.

If the Court had visualized the actual condition as reflected by the tables at pages 110 to 114, inclusive, of defendants' original brief, which disclosed that during the growing season from May to September over a period of 20 years, or a total of 3,340 days, that in 1905 of these days a flow of less than 100 second-feet passed across the state line, while in 1,359 days of the same period the flow had been reduced to less than 50 second-feet, it would have understood why in order to attempt to preserve any semblance of irrigation many farmers under existing ditches were compelled to put in pumping plants to secure water. The statement of the Court, however, that such pumping is made at low initial and maintenance cost, as compared with direct irrigation under already constructed ditches, is contrary to all fact, and there is nothing in the entire record to support any such conclusion.

The Court Erred in Assuming Sites for Feasible Reservoir Development in Western Kansas

The Court stated that:

> "Though western Kansas affords sites for similar storage reservoirs, but one small basin has been constructed in that State."

It is true that but one storage reservoir has been constructed in Kansas in the area in question. It is not true that Western Kansas affords reservoir sites similar to those in Colorado, which are feasible or practical under existing conditions for development.

Colorado's Exhibit 139, found in Appendix "B" of Colorado's Original Brief must have been the basis for the Court's statement. It is unfortunate that the Court did not read the testimony in the record concerning this exhibit. Upon cross-examination Engineer Tipton, who prepared the exhibit, testified that he had studied only two of the reservoir sites described in the exhibit. He further testified that with reference to those two he had made little study concerning the *economic feasibility* of the projects. Relative to one of the sites studied he stated he was not prepared to say that it was economically feasible. The other he stated was feasible from the standpoint of water available, but he had not considered

loss by percolation, evaporation and transportation (R. 4812). With reference to the two sites studied by Engineer Tipton, Engineer Knapp testified at some length, his testimony beginning at page 5186 of the record and continuing to page 5198. Engineer Knapp showed that the two reservoirs were not practicable or economically feasible for a number of reasons, among them being an insufficient supply of water to justify the cost of construction; the limited life of a reservoir because of siltation, and in one instance to the difficulty entailed in transporting water through a canal over a considerable distance to the proposed site.

The Court Erred in Assuming That There Is a Question of the Right of Non Riparian Irrigators in Western Kansas to Divert Water From the Arkansas River for Irrigation.

The Court stated that there is serious question whether lands (in Kansas) which are not riparian may divert the water from the stream for irrigation.

The Court in making this statement referred to the Kansas Statute of 1886, and to two opinions of the Kansas Supreme Court relating to controversies over the use of water by riparian owners. The Court comments on the failure of Kansas in its brief and argument to refer

to the Kansas decisions, and to the fact that no showing was made with respect to the right of non-riparian owners to appropriate waters against objection by other such owners.

The true facts are that practically every acre of land irrigated in Kansas, in the area which is the subject matter of this dispute, is non-riparian land and from the beginning of irrigation in that region ample authority has existed under statute for such use, and because of such statutory authority no objection can be raised by anyone to such use.

Section 5, Article 2, Chapter 23, General Statutes of Kansas, 1868, authorized the formation of private corporations:

> "For the construction and maintenance of canals for the purposes of irrigation or manufacturing purposes."

This statute was amended in 1876 by Chapter 58 of the Laws of 1876 to include the following proviso:

> "That it shall be unlawful for any corporation or person to locate or construct any irrigating canal along or upon any stream in such manner as to interfere with or in any wise hinder, delay or injury any milling or irrigating improvements already constructed or located along or upon any

stream of water, or to diminish the supply of water flowing to or through any established irrigating canal."

The validity of these statutes has never been challenged in Kansas Courts although some Kansas ditches were constructed to irrigate non-riparian land as early as 1879.

As previously stated it is quite obvious from the opinion that the Court has not made a complete and exhaustive study of the evidence in this case. It was physically impossible for the Court to have done so in the limited time available. A considerable number of those facts asserted by the Court in its opinion defendants have hereinbefore demonstrated to be in error.

The Special Master, appointed by the Court, of necessity spent many months studying the record. In addition the Special Master heard some of the testimony and had the opportunity to observe some of the witnesses. Apparently the Court feels that the Special Master selected by it could and should have supported his basic conclusions with the supporting evidence he believed, and should have shown to the Court why other evidence was discarded by him. Kansas should not, however, be penalized for the failure of the Special Master to do so.

The basic conclusions arrived at by the Special Master,

defendants believe, were correct. An abundance of competent undisputed testimony supporting his conclusions is contained in the record. It seems only fair and reasonable that the Court, rather than to discard the findings of the Master, should have given the same careful consideration to the evidence that the Master did; or, in the alternative, the Court should have referred the matter back to the Master, instructing him to corroborate his findings with evidence contained in the record.

This Court in *Kansas v. Colorado,* 206 U. S. 46, first stated the principle of the equitable apportionment of the waters of an interstate stream. That principle has been reasserted in numerous cases since that time, and given practical application in at least two instances (*Wisconsin v. Illinois,* 281 U. S. 179, and *Wyoming v. Colorado,* 259 U. S. 419). If the decision rendered in this case is permitted to stand that principle becomes only a theory with no practical value.

The Federal Constitution recognizes but two methods of determining disputes between states. Such disputes may only be determined by interstate compact or by a decision of this Court. The two states involved in the controversy are aware of the fact that such controversies may best be determined by interstate compact; they

also know that this Court has previously stated its preference that disputed matters between states be so settled where possible. Only recently such a compact involving the waters of another stream common to the two states was agreed upon. That course of action, however, is not always feasible and such is the case here. Through many years of changing administrations in both states officials have worked diligently and in good faith to agree to a fair division of the waters of the Arkansas River.

Either of the two states could very profitably use all of the waters of the Arkansas River, if properly regulated, for irrigation purposes. This being so, the possibility of agreement becomes necessarily one of compromise. Since Colorado has the first opportunity to divert the waters of the Arkansas River, if this Court refuses to take jurisdiction, and thus removes the possibility of compulsion by Court action, no reason other than that of good will exists for Colorado to compromise. Good will has not heretofore been shown to be a controlling factor when in competition with financial gain or loss.

Expert engineers have spent many years and thousands of dollars in producing the evidence introduced in this case. A very considerable amount of that evidence should be preserved by being included in a decision rendered by

this Court. If this Court has not the time to do so, the matter should be again referred to a special master in order that the basic facts be determined, together with instructions as to the extent to which the Court desires a recitation of the evidence relied upon by such master. Sound precedent exists for such action. In *Wisconsin v. Illinois*, supra, the Court referred the case three times to the Special Master Charles Evans Hughes.

Upon the basis of all of the foregoing, defendants respectfully request a re-hearing, with ample time allowed in which to file a complete abstract of the record; or in the event that a thorough examination of such record imposes too heavy a burden upon the time of the Court, that the matter be either rereferred to the present Special Master, who is thoroughly familiar with the evidence, with directions as to the detail which the Court demands in its special findings and conclusions, or to some other special master whom this Court could instruct in advance as to the requirements respecting detailing evidence which it will require in such report.

Respectfully submitted,

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W. E. STANLEY,
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Certificate

STATE OF KANSAS, SHAWNEE COUNTY, ss.

I, A. B. Mitchell, Attorney General of the State of Kansas, one of counsel appearing for the defendants in the above entitled action, hereby certify that I have read the Petition for rehearing, have assisted in the preparation of the same, and know the contents thereof, and that said petition is presented in good faith and not for delay.

A. B. MITCHELL,
Attorney General of Kansas.

20-2103

p. 6,

SUPREME COURT OF THE UNITED STATES.

No. 5, Original.—October Term, 1943.

The State of Colorado, Complainant,
vs.
The State of Kansas, et al.
} Bill in Equity.

[December 6, 1943.]

Mr. Justice Roberts delivered the opinion of the Court.

This suit is the latest of a series of litigations between Kansas, or her citizens, and Colorado, or her citizens, concerning their respective rights to the beneficial use of the waters of the Arkansas River.

The river has its origin in central Colorado, and is a mountain torrent for 130 miles to a point near Canon City where it enters a foothill region ending near Pueblo. Thence it traverses the high plains of eastern Colorado and western Kansas. In the areas mentioned the stream is non-navigable.

In 1901 Kansas brought suit against Colorado in this court for an injunction restraining the latter from diverting, or permitting anyone under her authority to divert, waters of the river within Colorado, and for general relief. *Kansas* v. *Colorado*, 206 U. S. 46.[1] Kansas in her bill alleged that the waters of the river had been used for irrigation in her western counties and that, after establishment of these uses, Colorado began systematically to appropriate and divert them between Canon City and the Kansas state line for irrigating non-riparian arid lands; that, by 1891, all the natural flow, and much of the flood waters, had been appropriated in Colorado so that the average flow had been greatly reduced and the natural flow completely cut off.

Colorado replied that the stream was not continuous except at times of flood; that, in a state of nature, its bed east of Pueblo was frequently dry; that Colorado and her citizens had diverted and used only the perennial flow above Canon City and what had been done in effect conserved water for delivery into Kansas.

[1] The court overruled a demurrer to the bill and required Colorado to answer. Kansas v. Colorado, 185 U. S. 125.

She denied she had substantially diminished the flow of the river at the state line. She asserted she was entitled to consume the entire flow; but alleged that, in any view, her total appropriations did not amount to an infringement of Kansas' rights calling for judicial interference.

The court denied Kansas' contention that she was entitled to have the stream flow as it flowed in a state of nature. It denied Colorado's claim that she could dispose of all the waters within her borders, and owed no obligation to pass any of them on to Kansas. It declared that as each state had an equality of right each stood before the court on the same level as the other; that inquiry was not confined to the question whether any portion of the river waters were withheld by Colorado but must include the effect of what had been done upon the conditions in the respective states; and that the court must adjust the dispute on the basis of equality of rights to secure, so far as possible, to Colorado, the benefits of irrigation, without depriving Kansas of the benefits of a flowing stream. The measure of the reciprocal rights and obligations of the states was declared to be an equitable apportionment of the benefits of the river. The court added that, before the developments in Colorado consequent upon irrigation were to be destroyed or materially affected, Kansas must show not merely some technical right but one which carried corresponding benefits.

On examination of the proofs, the court concluded that diversions authorized by Colorado embraced more water than the total flow at Canon City. It found, however, that no clear showing was made as to what surplus water, if any, was contributed by the tributaries below that point or as to the proportion of the diverted water returned to the river by seepage. The opinion described the diversions in each state, analyzed the use made of the water and the benefits derived from it in each, considered population tables and agricultural statistics bearing upon the growth of the communities adjacent to the river in each, and stated conclusions, now material, as follows: That the result of Colorado's appropriations had been beneficial reclamation of many acres; that, while the influence of Colorado's diversions had been of perceptible injury to portions of the Arkansas valley in Kansas, yet to the great body of the valley the diminution of

flow had worked little, if any, detriment; that regarding the interests of both states, and the right of each to receive benefit through irrigation and otherwise from the waters of the stream, the court was not satisfied that Kansas had made out a case entitling it to a decree. The court added that if depletion by Colorado continued to increase there would come a time when Kansas might justly say that there was no longer an equitable distribution of benefits and might rightly call for relief against Colorado and her citizens. Accordingly the bill was dismissed without prejudice to future action by Kansas. The taking of evidence ended June 16, 1905, and the decision of the court was announced May 13, 1907.

October 30, 1909, the Finney County Water Users' Association, which maintained the so-called Farmers Ditch in Kansas, applied to a Kansas court for adjudication of priorities as between various Kansas users of the river water. One of the defendants, the United States Irrigating Company, removed the cause to the United States District Court. A consent decree was entered May 16, 1911, which provided for the allocation and rotation of use amongst certain, but not all, the Kansas ditches, including the Farmers' Ditch. It was, however, provided that the settlement should remain binding upon the parties only until the adjudication of other litigation next to be noticed.

August 27, 1910, United States Irrigating Company sued Graham Ditch Co. and others holding Colorado priorities, in the United States District Court for Colorado, to obtain an adjudication of priorities as between Kansas users and Colorado users. The Finney County Association was denied leave to intervene. Evidence was taken, but the suit was settled by a contract of February 19, 1916. By this settlement, the Colorado defendants agreed to recognize priorities as of August 27, 1910, for all the Kansas ditches in Finney County except the Farmers' Ditch; not to apply for, or claim, priorities for storage purposes on the Purgatoire River, a tributary of the Arkansas, or below the mouth of the Purgatoire, of a date earlier than August 27, 1910; and to pay the costs of suit and an additional sum to the Kansas interests. The Kansas ditches agreed to accept the priority date of August 27, 1910, and the quantities of water specified in the contract, as a definition and

determination of their rights. The defendants complied with the terms of the contract.

The Finney County Association declined to become a party to the contract and, on November 27, 1916, brought suit in the United States District Court for Colorado against the same defendants for relief like that sought in the United States Irrigating Company's suit. January 29, 1923, the Finney County Association brought a second suit in the same court against other Colorado defendants for similar relief. January 24, 1928, Colorado filed the present bill against Kansas and the Finney County Association.

After formal recitals, the bill refers to our earlier decision, states that, in reliance upon it, money has been spent in the improvement of the irrigation systems in Colorado, recites the prior and the pending private litigation against Colorado appropriators, alleges that the establishment of an interstate priority schedule sought in the pending suits would disrupt and destroy Colorado's administration of the waters of the Arkansas basin and result in conflict of state authority, asserts that no proper settlement of the relative rights of the States can be obtained in suits by Kansas appropriators against Colorado appropriators, outlines other injury to Colorado threatened by prosecution of the pending cases to judgment, and prays that the Finney County Association be enjoined from further pressing those suits, that Kansas and her citizens be enjoined from litigating, or attempting to litigate, the relative rights of the two states and their citizens to the waters of the river on claims similar to those made by the Association in its pending suits, and that the rights of Colorado and her citizens as determined by the judgment in *Kansas* v. *Colorado* be protected.

Kansas' answer admits some allegations of the bill and denies others, sets forth her alleged rights in the waters of the river, recites appropriations by Kansas residents and citizens, diversions by Colorado citizens under appropriations junior in time and inferior in right to those made in Kansas, and asserts that, since the filing of the complaint in *Kansas* v. *Colorado*, Colorado users have largely increased their appropriations and diversions, and threaten further to increase them, to the injury of Kansas users. She prays that the court protect and quiet her rights and those of her citizens and residents, including the Finney County Association, to their appropriations, that the rights of her citizens and

residents to divert water from the river for irrigation be decreed in second feet and that Colorado, her officers, agents, and citizens be perpetually enjoined from diverting any waters from the river or its tributaries in Colorado until the rights of Kansas, her citizens and residents, are satisfied.

The Finney County Association filed an answer admitting and denying averments of the bill and affirmatively praying that Colorado and her citizens be enjoined from diverting water from the river until the Association's right to 250 second feet is satisfied. The issues were made up by Colorado's reply.

Pursuant to our order, evidence was taken by a Commissioner. Thereupon the cause was referred to a Master with leave to take additional evidence, and direction, in the light of all the evidence, to state findings of fact, conclusions of law, and to recommend a form of decree. The evidence consists of some seven thousand typewritten pages of testimony and 368 exhibits covering thousands of pages.

The Master states that the "evidence is voluminous and conflicting on many of the material issues of fact", but his report contains no discussion or analysis of the proofs. Apart from formal recitals, the report consists of fourteen findings of fact,—more properly conclusions of fact,—nine conclusions of law, and a recommended form of decree. Each party has filed exceptions.

Three questions emerge from the pleadings. (1) Is Colorado entitled to an injunction against the further prosecution of litigation by Kansas users against Colorado users? (2) Does the situation call for allocation of the waters of the basin as between Colorado and Kansas in second feet or acre feet? (3) Has Kansas proved that Colorado has substantially and injuriously aggravated conditions which existed at the time of her earlier suit?

The Master concluded that the first question should be answered in the affirmative. Kansas has not excepted to the conclusion or to the corresponding provisions of the proposed decree.

Bearing upon the second question, the Master found that "the average annual natural flow of the river and its tributaries" is 1,240,000 acre-feet, and the "average annual dependable and fairly continuous water supply and flow" 1,110,000 acre feet. He recommends that the dependable flow be allocated 925,000 acre feet to Colorado and 185,000 acre feet to Kansas, 150,000 thereof between

April 1 and October 1, and 35,000 between October 1 and April 1 of each year, that is, five-sixths to Colorado and one-sixth to Kansas. He submits a form of decree embodying this allocation and adjusting required deliveries in the same proportions upward or downward in accordance with annual flows in excess of, or less than, the stated average annual dependable flow. He has not attempted to define flood waters or the extent to which they are usable by either state, and suggests no provision whereby their occurrence may be taken into account in defining Colorado's obligation to deliver water to Kansas. The form of decree requires measurement of flow by gauges, one at Canon City and the other at the mouth of the Purgatoire, and deliveries to Kansas prorated to the total of the flows at those points.

Both States except to these features of the decree as ambiguous and impossible of administration. Kansas, while asserting that the award to her is inadequate, professes her willingness to accept the recommended allocation, but insists that the decree require Colorado to deliver the quantity of water awarded to Kansas when and as demanded by her. Colorado asserts that the recommended decree,—much more Kansas' proposed amendment,—would entail serious and unjustified damage to her interests, if indeed compliance with its terms were possible.

In respect of the third question, the Master finds:

"There has been since the taking of testimony in the case of Kansas against Colorado cited in 206 U. S. 46, in 1907, a material increase in the river depletion by Colorado of the water supply of the Arkansas River, which has been consumed and used by Colorado users for irrigation purposes and which has diminished the flow of the water into the State of Kansas and that by reason thereof there has been injuries to the substantial interests in Kansas."

No exception is taken to the Master's recommendation that an injunction issue against further prosecution of the Finney County Association suits against Colorado. In our view such an injunction is appropriate, and should be granted.

Colorado urges that our decision in *Kansas* v. *Colorado*, *supra*, amounted to an allocation of the flow of the Arkansas River between the two States. We cannot accept this view. In that case Kansas labored under a burden of proof applicable in litigation between quasi-sovereign states, of which more hereafter. The dismissal of her bill resulted from the conclusion that she

had failed to sustain the burden. But from the decision then rendered it follows that unless Kansas can show a present situation materially different from that disclosed in the earlier case she cannot now obtain relief.

The prayer of Kansas for an apportionment in second-feet or acre feet cannot be granted. In our former decision we ruled that Kansas was not entitled to a specific share of the waters as they flowed in a state of nature, that it did not then appear that Colorado had appropriated more than her equitable share of the flow, and that if Kansas were later to be accorded relief, she must show additional takings working serious injuries to her substantial interests. This was in accord with other decisions in similar controversies.[2]

The reason for judicial caution in adjudicating the relative rights of states in such cases is that, while we have jurisdiction of such disputes,[3] they involve the interests of quasi-sovereigns, present complicated and delicate questions, and, due to the possibility of future change of conditions, necessitate expert administration rather than judicial imposition of a hard and fast rule. Such controversies may appropriately be composed by negotiation and agreement, pursuant to the compact clause of the Federal constitution. We say of this case, as the court has said of interstate differences of like nature, that such mutual accommodation and agreement should, if possible, be the medium of settlement, instead of invocation of our adjudicatory power.[4]

It follows that the Master erred in attempting to divide what he designated as the "average annual dependable" water supply of the Arkansas River in Colorado into fractions and awarding those fractions to the states respectively. Such a controversy

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[2] See the cases in notes 3, 4 and 6 *infra*. In New Jersey v. New York, 283 U. S. 336, 347, the prayer of Pennsylvania for such an allocation was denied. Wyoming v. Colorado, 259 U. S. 419, is not an exception. As it happened, the doctrine of appropriation had always prevailed in each of the states there concerned and furnished the most appropriate and accurate measure of their respective rights of appropriation of the flow of the Laramie River. It was, therefore, possible in enforcing equitable apportionment, to limit the amount of water which Colorado might, without injury to Wyoming's interests, divert to another water shed, to an amount not exceeding the unappropriated flow.

[3] Missouri v. Illinois, 180 U. S. 208; Kansas v. Colorado, 206 U. S. 46, 95–98.

[4] See Washington v. Oregon, 214 U. S. 205, 218; Minnesota v. Wisconsin, 252 U. S. 273, 283; New York v. New Jersey, 256 U. S. 296, 313. Compare the Colorado River Compact of Nov. 24, 1922, authorized by Act of August 19, 1921, 42 Stat. 171, and dismissed in Arizona v. California, 292 U. S. 341, 345; and compare Wiederlieder v. La Plata R. & C. C. Dutch Co., 304 U. S. 92.

as is here presented is not to be determined as if it were one between two private riparian proprietors or appropriators.[5]

The lower state is not entitled to have the stream flow as it would in nature regardless of need or use.[6] If, then, the upper state is devoting the water to a beneficial use, the question to be decided, in the light of existing conditions in both states, is whether, and to what extent, her action injures the lower state and her citizens by depriving them of a like, or an equally valuable, beneficial use.[7]

We come now to the vital question whether Kansas has made good her claim to relief founded on the charge that Colorado has, since our prior decision, increased depletion of the water supply to the material damage of Kansas' substantial interests. The question must be answered in the light of rules of decision appropriate to the quality of the parties and the nature of the suit.

In such disputes as this, the court is conscious of the great and serious caution with which it is necessary to approach the inquiry whether a case is proved. Not every matter which would warrant resort to equity by one citizen against another would justify our interference with the action of a state, for the burden on the complaining state is much greater than that generally required to be borne by private parties. Before the court will intervene the case must be of serious magnitude and fully and clearly proved.[8] And in determining whether one state is using, or threatening to use, more than its equitable share of the benefits of a stream, all the factors which create equities in favor of one state or the other must be weighed as of the date when the controversy is mooted.

On this record there can be no doubt that a decree such as the Master recommends, or an amendment or enlargement of that decree in the form Kansas asks, would inflict serious damage on existing agricultural interests in Colorado. How great the injury would be it is difficult to determine, but certainly the proposed decree would operate to deprive some citizens of Colorado, to some

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[5] Kansas v. Colorado, *supra*, 100.

[6] Colorado v. Kansas, *supra*, 85, 101-102; Connecticut v. Massachusetts, 282 U. S. 660, 669-670; Washington v. Oregon, 297 U. S. 517 523, 526.

[7] Cases cited in Note 8.

[8] Missouri v. Illinois, 200 U. S. 496, 520-521; New York v. New Jersey, 256 U. S. 296, 309; North Dakota v. Minnesota, 263 U. S. 365, 374; Connecticut v. Massachusetts, 282 U. S. 660, 669; Alabama v. Arizona, 291 U. S. 286, 292, Washington v. Oregon, 297 U. S. 517, 522.

extent, of their means of support. It might indeed result in the abandonment of valuable improvements and actual migration from farms. Through practice of irrigation, Colorado's agriculture in the basin has grown steadily for fifty years. With this development has gone a large investment in canals, reservoirs, and farms. The progress has been open. The facts were of common knowledge.

The controversy was litigated in 1901. Kansas was denied relief in 1907. The dispute between appropriators in the two states was brought into court in 1910 and settled in 1916. The Finney County Association sued Colorado appropriators in 1916 and 1923. Even if Kansas' claims of increased depletion and ensuing damage are taken at face value, it is nevertheless evident that while improvements based upon irrigation went forward in Colorado for twenty-one years, Kansas took no action until Colorado filed the instant complaint in 1928.

These facts might well preclude the award of the relief Kansas asks. But in any event, they gravely add to the burden she would otherwise bear, and must be weighed in estimating the equities of the case.[9]

The Master concludes that there has been a material increase in depletion by Colorado, a consequent diminution of flow across the state line, and injury to the substantial interests of Kansas. His report does not state what he considers material; or the extent of the diminution of flow; or the interests of Kansas which have been injured and the extent of the injury. We must, therefore, turn to the evidence to resolve the issues.

Kansas asserts that since the decision of *Kansas* v. *Colorado*, *supra*, Colorado has increased her consumptive use of the water of the Arkansas River by an annual average of between 300,000 and 400,000 acre feet. Witnesses so testified and, to support their conclusions, submitted elaborate calculations and analyses exhibiting the alleged total water supply of the river basin in Colorado and the alleged amount of water passing in the bed of the stream across the state line. A witness submitted tables covering the period 1895-1930 from which he deduced an average yearly water supply of 1,240,000 acre feet and an average annual dependable supply of 1,110,000 acre feet. He presented figures to show that Colorado's consumptive use had increased to the extent of an annual average of 300,000 acre feet. He reached this result by

[9] Washington v. Oregon, 297 U. S. 517, 526.

using estimated flow across the state line between 1895 and 1908 and measured flow between 1908 and 1930, during which period a gauging station was maintained at Holly near the line. Measurements indicate that, during the latter period, the average annual state line flow was 260,700 acre feet.[10] If, as claimed, this flow remained after an additional average annual depletion of 300,000 acre feet by Colorado, the average annual flow in the earlier period, 1895 to 1908, would necessarily have been greater by 300,000, or would have averaged 560,700 acre feet. The witness' own exhibit shows that he assumed an average annual state line flow for the period 1895-1899 of 300,000 acre feet, for 1900-1904, of 470,000 acre feet, and, for 1905-1909, of 454,000 acre feet, or an annual average over the total period, 1895-1909, of 408,000 acre feet. On his own estimates the claimed average annual depletion of 300,000 acre feet could not have taken place. Moreover, the force of this evidence is weakened by Kansas' allegations in *Kansas* v. *Colorado supra*. In her bill in that case she alleged Colorado had totally destroyed the normal flow of the river exclusive of floods whereas she now asserts that the flow at the time of the earlier suit was such that Colorado has been able to deplete it on an annual average of 300,000 acre feet.

The records of Colorado's consumption and ditch diversions, and the Colorado and Kansas exhibits showing the divertible and usable state line flow, rebut such an increase as Kansas asserts. Kansas' expert witness himself testified that the diversion records show no material change in Colorado diversions since 1905 and that if acreage in Colorado has expanded under the ditches on the main stem of the river it has done so because of an improved duty of water; that, during the period, the river gains due to return flow have increased, the consumptive use of water has declined, and relatively the stream flows have improved.

The Kansas ditches are capable of diverting water only up to 2,000 c. f. s. When the flow is greater the excess cannot be diverted and used. It is admitted that the character of the flow of the river in Colorado is variable from year to year, from season to season, and from day to day, and the main river below Canon City may

[10] In computing average annual flows, flood waters are included in the reckoning. As later shown, such annual averages do not represent the quantities of water usable by diversion ditches for irrigation.

be almost without water one day, run a flood the next day, and, on the following day, be in practically its original condition. Thus it appears that both in Colorado and in Kansas there may at one time be flood water unavailable for direct diversion and, at another, not enough water to supply the capacity of diversion ditches. The critical matter is the amount of divertible flow at times when water is most needed for irrigation. Calculations of average annual flow, which include flood flows, are, therefore, not helpful in ascertaining the dependable supply of water usable for irrigation. That supply has, in Colorado, been supplemented by the extensive use of reservoirs for storage of flood waters and winter flows not usable or needed for irrigation. Though western Kansas affords sites for similar storage reservoirs, but one small basin has been constructed in that State. On the other hand, the storage in Colorado, and the release of stored water to supplement the natural flow of the stream in times of need, operates by seepage and return to the channel to stabilize and improve the flow at the state line and, to that extent, benefits irrigation in Kansas.

Kansas relies heavily upon the increase of irrigated acreage in Colorado since our decision in 1907. The testimony in the earlier case was closed in 1905. The then latest available census,—for 1902,—reported 300,115 acres under irrigation in the Arkansas basin in Colorado. In its opinion the court referred to this figure. The next census,—for 1909,—gives the Colorado acreage as 464,236. The later reports disclose an addition of less than 5,000 acres between 1909 and 1939. Thus a total of about 170,000 additional acres has been put under irrigation since 1902. On its face this record would seem to indicate a large increase of consumptive use by Colorado, but the acreage under irrigation does not afford a reliable measure of actual consumption. When first turned in, the water is rapidly absorbed by the sub-soil with consequent high consumption. By continued irrigation the sub-soil becomes saturated, the water table rises, and water, in increasing quantities, flows back to the stream. Ultimately consumption falls well below diversion. The returned water again may be diverted and again supply return flows. Since the decision in the earlier case, studies of return flows have been made which indicate a steady reduction in the quantity of water consumed per acre of irrigated land.

Practically all of the affected Kansas ditches are in three western counties. Tables taken from the United States census show that, in 1899, acreage irrigated in these counties was 6% of that irrigated in the Colorado basin. In 1909 it was 7%, in 1929, 9.7%, and, in 1939, 10.7%. It seems that Colorado cannot have depleted the usable supply passing into Kansas if acreage under irrigation is any measure of depletion.

Whatever may be said of the practices of Colorado since 1905, Kansas is not entitled to relief unless she shows they clearly have entailed serious damage to her substantial interests and those of her citizens. It is not necessary to quote the findings of this court made in the earlier case. We need only say they disclose that some ditches in western Kansas had been abandoned for lack of available water and all ditches were suffering from shortages of flow. The court pointed out that Colorado had authorized diversions in excess of the flow at Canon City. And the record in the present case indicates that, except for seepage and return flow, the appropriations Colorado has authorized from the basin, as a whole, exceed the available dependable flow of the stream and its tributaries, and this appears to have been true also in 1901. It appears, nevertheless, that, since 1904, an increased quantity of usable water has passed the state line, for it is testified by Kansas' expert witness that, between 1895 and 1902, no divertible water passed the line and none between 1903 and 1907, except in 1903 and 1905, whereas, in each year since 1908 divertible water has crossed the state line, in varying quantities and, in most years, in substantial amounts.

Kansas, however, insists that 414,000 acres in western Kansas are susceptible of successful irrigation, and much of this land would have been irrigated had Colorado not deprived Kansas of her equitable share of the flow. The evidence is that the acreage now irrigated in Kansas lies close to the river and along the river bottom. The land claimed to be susceptible of irrigation extends many miles from the bed of the river. We are asked to speculate as to how much of this land would have been put under irrigation under more favorable circumstances.

As has been pointed out, despite Colorado's alleged increased depletion, the acreage under irrigation in western Kansas through existing ditches has steadily increased, over the period 1895-1939, from approximately 15,000 acres to approximately 56,000 acres.

Moreover, the arid lands in western Kansas are underlaid at shallow depths with great quantities of ground water available for irrigation by pumping at low initial and maintenance cost. There is persuasive testimony that farmers who could be served from existing ditches have elected not to take water therefrom but to instal pumping systems because of lower cost.

Again, there is serious question whether lands which are not riparian may divert the water from the stream for irrigation. In the earlier suit Kansas asserted,[11] and the court held,[12] that the common law prevailed in Kansas and governed the rights of riparian owners. It is true that the rule as to riparian rights has been expanded by the common law of Kansas to permit a riparian proprietor reasonable use of the waters of a stream for irrigation.[13] But such use is subject to the rights of other riparian owners to a like reasonable use. What is reasonable must, in each instance, be determined in the light of total supply and total need of all riparian owners.[14] It is also true that, beginning in 1886, Kansas, by statutes recognized appropriation for irrigation. But there is doubt whether the privilege is not restricted to riparian owners in some portions of the state. The Supreme Court of Kansas has held that, where a title originates in a grant antedating the Act of 1886, the right of appropriation is limited by the common law as to riparian rights, which are rights of property derived from the original patent or deed in the line of title.[15] It seems that title to much of the land along the Arkansas Valley in western Kansas was originally granted or patented prior to 1886. The brief and argument of Kansas, while referring to the statutes of the state authorizing appropriation, make no reference to the Kansas decisions and no showing with respect to the right of non-riparian owners to appropriate waters against objection by other such owners.

The official census figures submitted bearing upon population of the western counties of Kansas, and the agricultural production in them, give no support to a claim that the inhabitants have

[11] 206 U. S. 51, 52, 58, 59, 60, 61.

[12] *Ibid.*, 95, 99, 102, 104.

[13] Campbell *v.* Grimes, 64 Pac. 62.

[14] Clark *v.* Allaman, 71 Kan. 206.

[15] Frizell *v.* Bindley, 144 Kan. 84. Cf. Smith *v.* Miller, 147 Kan. 40; 75 P. 2d 273.

suffered for lack of arable and productive land. Generally speaking, the population has steadily increased and the agricultural production has also risen throughout the period in question.

All these considerations persuade us that Kansas has not sustained her allegations that Colorado's use has materially increased, and that the increase has worked a serious detriment to the substantial interests of Kansas.

A decree should be entered enjoining the further prosecution of the Finney County Association's suits, and dismissing the prayers of both States for other relief. The parties may submit such a decree.

A true copy.

Test:

Clerk, Supreme Court, U. S.